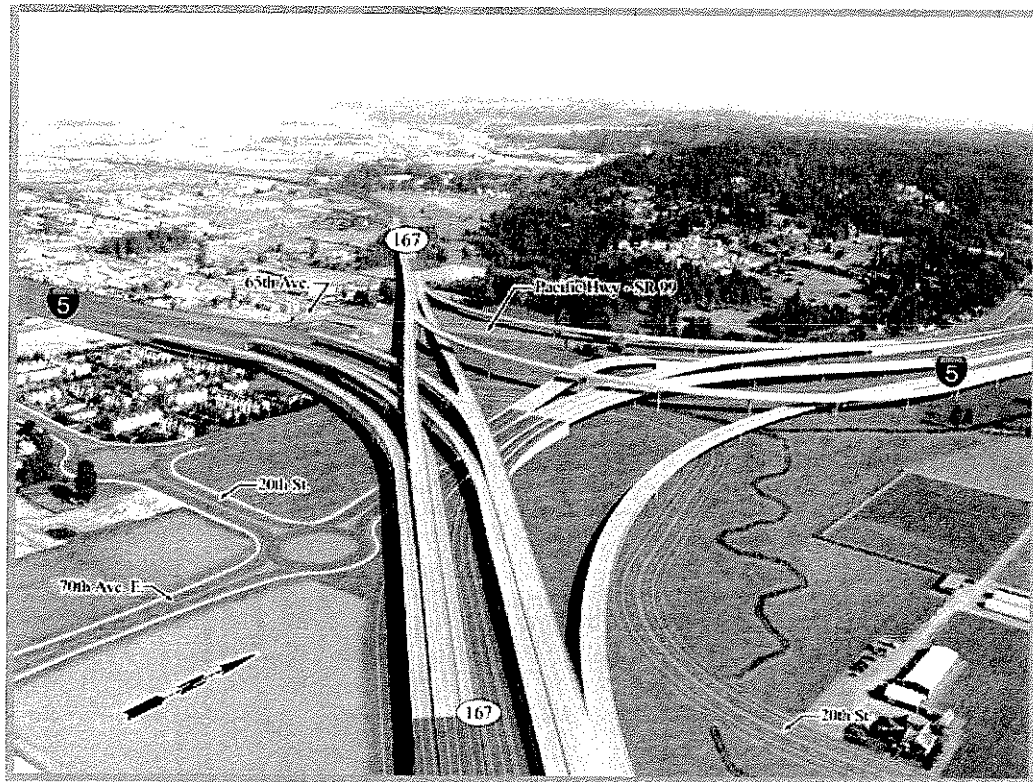




**Washington State
Department of Transportation**

Access Point Decision Report Assumptions SR 167 - Puyallup to SR 509



*Prepared By:
Washington State Department of Transportation
Tumwater Design Office
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The undersigned parties concur with the Access Point Decision Report Assumptions for the SR 167/I-5 Interchange as part of the SR 167 - Puyallup to SR 509 project as presented in this document.

WSDOT


Signature

Asst. State Design Engineer
Title

2/15/05
Date

FHWA

Signature

Title

Date

Introduction and Project Description

The proposed SR 167 extension project connects the existing freeway terminus of SR 167 in Puyallup with existing SR 509 near the Port of Tacoma. On August 3, 2004, representatives from WSDOT and the Federal Highway Administration (FHWA) met to discuss issues specific to the I-5 interchange. During the meeting it was agreed that the designation of the segment between existing SR 509 and I-5 be changed from SR 167 to SR 509. A technical memorandum to be attached to the Access Point Decision Report (APDR) will describe the reasons for this proposed change.

The SR 167 extension to the I-5 interchange would replace the existing SR 167 arterial route between Puyallup and the I-5 Bay Street Interchange via North Meridian and River Road. This segment of the project will build two general-purpose lanes in each direction and one HOV lane in each direction. A freeway-to-freeway interchange is being designed to connect SR 167 with SR 509 and I-5. Because of the complexity of the I-5 interchange only one design option has been developed for this location. The proposed SR 509 extension will build two general purpose lanes in each direction, no HOV lanes. This segment of new freeway will terminate at the new I-5 interchange with connections to I-5 and SR 167. For purposes of clarity and continuity with existing reports, this document refers to the proposed freeway extension from Puyallup to the Port of Tacoma as SR 167.

The SR 167/I-5 interchange was developed using recommendations from the Value Engineering (VE) study. The VE study team included individuals with expertise in various engineering disciplines to develop a best design option at the interchange location. The VE team included representatives from FHWA, the City of Fife, and WSDOT. The VE study recommended one design option after examining myriad options that included multiple I-5 and SR 167 ramp connections and alignments. The VE team proposed six recommendations. One of the key recommendations to be adopted was to use one through lane on mainline SR 167 for northbound and southbound traffic across I-5. Another key recommendation adopted from the VE study was to limit the interchange to three levels by keeping the southbound SR 167 on Level II and raising the northbound SR 167 to Level III, and providing direct-connect ramps from SR 167 to I-5 from the left side. This was not considered a deviation by the VE team because Tier I EIS described the SR 509 to I-5 portion of the SR 167 a spur route, with SR 167 essentially ending at the I-5 interchange. The VE study team considered the left off-connections a bifurcation of the SR 167 freeway.

The project office is developing an APDR for SR 167 interchange with I-5, which will be submitted to FHWA for initial review in January 2005. The technical memorandum attachment in Appendix C of the APDR will address I-5 interchange crossing and connection decisions and justifications. made August 3, 2004 with FHWA.

Design Year and Opening Year

Construction of the project is scheduled to begin in 2008. The opening year has been established to be 2015. The design year has been established to be 2030, approximately 20 years out from the anticipated start of construction. The design year in the Tier I EIS was 2020. At the SR 167 Tier II EIS Access Steering Committee meeting on March 9, 2000, FHWA agreed that the design

year could be changed to 2030 for the Tier II EIS. Travel forecasts and traffic operational analysis for both year 2015 and 2030 will be included in the SR 167 Tier II Environmental Impact Statement (EIS).

Project Limits

The proposed SR 167 Extension project runs through portions of Pierce County and the cities of Fife, Puyallup, Milton, Tacoma, and Edgewood. The bulk of the project is within the city limits of Fife. The SR 167 Extension project preferred corridor, Alternative 2 from the Tier I EIS, extends from the termination of existing SR 167 in Puyallup to the connection with existing SR 509 near Alexander Avenue in the Port of Tacoma. The build alternative includes freeway-to-freeway connections with SR 509, SR 167, and I-5. Also, it includes new local access interchanges at 54th Avenue East and Valley Avenue and completion of the SR 161 interchange. As part of the SR 161 interchange, the current bridge over the Puyallup River will be replaced.

Study Area

In January 2001, representatives from WSDOT and FHWA met as a support team for the purpose of guiding the preparation of the APDR. They agreed that the study area for the APDR would be I-5 between Port of Tacoma Road and SR 18, and proposed SR 167 from 54th Avenue E. to Valley Avenue E. At a January 2003 meeting between WSDOT and FHWA it was decided that the study area would be limited to those roadways immediately serving I-5 between Port of Tacoma Road and SR 18.

In February 2001 WSDOT and FHWA determined that no Origin & Destination Study (O&D) would be required because the regional traffic model used captured the O&D information in the Build and No Build traffic distributions. This decision was reaffirmed at the January 2003 meeting between WSDOT and FHWA.

I-5 Interchanges

The I-5 interchanges within the study area for this Access Point Decision Report are as follows:

Port of Tacoma Road Interchange

– Port of Tacoma Road is a principal freight route to/from Port of Tacoma

54th Avenue Interchange

– A high volume interchange providing access to/from the Port of Tacoma

Proposed SR 167, I-5 Interchange

– This interchange will provide all freeway connections except the following two movements that are not required due to low traffic volume:

- the connection from northbound SR 167 to southbound I-5; and
- the connection from northbound I-5 to southbound SR 167.

Low traffic volumes and traffic analysis support elimination of these two traffic movements from the new interchange. These lower traffic volume movements would continue to be served at the 54th Avenue interchange and/or the Port of Tacoma Road interchange.

HOV lanes will not be provided between SR 509 and I-5. HOV direct access ramps will be provided for the following four movements:

- southbound I-5 to northbound SR 167;
- northbound I-5 to northbound SR 167;
- southbound SR 167 to northbound I-5; and
- southbound SR 167 to southbound I-5

To reduce costs and other impacts, only one lane in each direction on SR 167 is proposed for the bridge across I-5. I-5 will be widened between the 54th Avenue East interchange and the existing Porter Way over crossing. A collector-distributor (C-D) road will be provided for the northbound I-5 off ramp to northbound SR 167. North of the interchange, the I-5 mainline will be widened to accommodate the on and off ramps to SR 167.

SR 18 Interchange

SR 18 is a principal freight route to/from eastern Washington via I-90. Analysis of this existing interchange is included in the APDR study area.

- Any future modifications of the I-5 interchange, and/or future on/off ramps as a result of the Triangle Study (I-5, SR 161, and SR 18) will be the responsibility of a future I-5/SR 161 APDR. These possible future modifications are not included in this study. The Triangle Study will be referenced only in the APDR.

SR 167

Analysis of the existing SR 167 interchange at Bay Street, south of the proposed I-5 interchange, is not included in the study area.

SR 509

Analysis of the proposed connection from SR 167 to SR 509 at the Port of Tacoma is not included in the study area.

Surface Streets

The following local system intersections would be affected by the I-5 access change:

- Port of Tacoma Road and SR 99
- Port of Tacoma Road and 20th Street E.
- 54th Avenue E. and SR 99
- 54th Avenue E. and 20th Street E.

Traffic Operations Analysis

The Highway Capacity Manual, or HCM (Transportation Research Board, 2000) was used as the primary reference for the *SR 167 Extension Final Traffic Report for Tier II EIS*. Highway Capacity Software (HCS) 2000, Corsim 5.07, and Synchro 5.0 software were the technical tools used to calculate the freeway, ramp and intersection operations level of service (LOS). The LOS concept provides a standardized interpretation of specific quantitative measurements characterizing operational conditions, such as speed, travel time, freedom to maneuver, traffic interruptions, comfort, and convenience.

Future traffic volumes were generated using Pierce County and Puget Sound Regional Council (PSRC) Travel Demand Forecast Models. Using both models in developing the traffic forecasts capitalizes on the strengths of each, providing more confidence in the final result. The procedure uses 2020 general purpose (GP) lane traffic forecasts from the Pierce County 2020 model, and extrapolates these results to get initial 2015 (opening year) and 2030 (design year) GP forecasts. The GP and HOV forecasts from the PSRC 2020 and 2030 models provided a cross check for the initial Pierce County model 2015 and 2030 GP forecasts, and were used to develop final 2015 and 2030 HOV forecasts. To take advantage of the strength of each model, general-purpose traffic volume on I-5, and HOV volume generally, were developed primarily based on the PSRC model, while traffic volumes on the SR 167 Extension, as well as other surface streets within the study area, were developed primarily using the Pierce County model.

The *Policy Point 4 - Need for Access* section of the APDR will describe existing year (2000), no-build in opening year (2015), and no-build in design year (2030) LOS, both AM and PM, for mainline I-5 (each direction) and study area interchange ramps.

The *Policy Point 6 – Operational and Accident Analysis* section of the APDR will describe build in opening year (2015) and build in design year (2030) LOS, both AM and PM, for mainline I-5 (each direction) and study area interchange ramps.

Figures in the APDR will show the following information for existing year, opening year, and design year build and no build scenarios:

- Peak AM and PM volumes for mainline (each direction) and ramps
- Interchange and intersection directional movement volumes for right turns, through, and left turns. The four intersections analyzed are Port of Tacoma Road at SR 99 and 20th Avenue E., and 54th at SR 99 and 20th Avenue E.
- Distances between interchanges
- Terrain is level
- Average vehicle length = 25 feet
- PHF = 0.95
- Percent trucks/buses:
 - Port of Tacoma Road I/C – I-5 = 5%; Ramps = 12%
 - All other I-5 I/C locations – I-5; 5%; Ramps = 5%
 - SR 167 Extension I/C – SR 167 = 25%; Ramps = 25%
- Driver population adjustment factor = 1.0
- Base free flow speed on I-5 = 70 mph
- Ramp free flow speed = 45 mph
- Lane width = 12 feet
- Right shoulder lateral clearance > 6 feet
- Interchange density = 1.0
- Rural freeway = No

Merge/Diverge/Weaving Issues

In most areas, LOS under the build condition will be better than the no build condition. However, at the new interchange the merge from NB and SB SR 167 to NB I-5, and the diverge from SB I-5 to NB and SB SR 167 will operate at LOS F in the design year.

A northbound collector-distributor (C-D) running between 54th Avenue and the I-5/SR 167 interchange is fundamental to proper operation of the freeway in this area. The northbound I-5 off-ramp to northbound SR 167, and the 54th Avenue East on-ramp to northbound I-5 both use the C-D, creating a weave section here.

Traffic flow on the C-D was modeled using CORSIM 5.0, assuming a free flow speed of 35 mph on the 54th Avenue East on ramp, and a free flow speed of 50 mph on the C-D. Analysis showed a speed of 48 mph, and a density of 15-vehicles/lane-mile, during both the AM and PM peak periods in 2030. These results show that the weave characteristics of this facility are acceptable.

Travel Forecasts

Travel forecasts were developed for the years 2015 and 2030 for the study area movements described above. The following resources were used in the development of the traffic forecasts:

- Puget Sound Regional Council (PSRC) Land User and Travel Demand Forecasting Models, Current Model Documentation. Final Report prepared for PSRC by Cambridge Systematic, Inc. and Urban Analysis, June 30, 2001.
- Pierce County EMME/2 Travel Demand Forecast Model

Both models utilize the traditional four step modeling process: trip generation, trip distribution, mode split, and traffic assignment. At the time forecasts were developed the PSRC model had very preliminary 2030 forecast year results, the Pierce County Model output was for year 2020 and was extrapolated out to 2030. Both models were used to create 2030 traffic volumes. The traffic forecasts include AM and PM peak hour general purpose (GP), as well as high occupancy vehicle (HOV) trips for the roads, freeway ramps, and intersections in the study area. Freeway traffic volumes in the corridor reach their highest levels during the AM and PM commute hours. The HOV occupancy is defined as two people and above per vehicle in the year 2015 (3+ HOV in 2030).

Travel Forecast Model Assumptions

At the SR 167 Tier II EIS Access Steering Committee meeting on March 9, 2000, FHWA agreed that the PSRC 2030 travel demand forecast model could be used for the Tier II EIS. At the same meeting FHWA expressed their expectation that any proposed feature from which WSDOT claims a traffic operational benefit be built in the initial construction and be operational in the defined year of opening for the project.

The PSRC model was developed to forecast Average Daily Traffic (ADT), AM and PM peak three hours, transit, HOV and commuter rail passenger volumes. The peak hour volume used in the APDR is taken as 35% of the three hour assignment. Since it has a regional focus, its traffic analysis zones (TAZ) are relatively large and the model networks include only major regional

facilities. As a result, the model is able to generate more reasonable forecasts for major regional freeways, but the local surface street output for the network is fairly crude. The Pierce County model has a finer TAZ structure and includes more local roads, thus it is able to provide more reasonable forecasts for the local transportation networks. The drawback of this model was that it did not have a calibrated AM peak hour model. Therefore, both models were used.

The initial 2030 land use data were developed by PSRC as a working draft for updating the PSRC's 2030 Metropolitan Transportation Plan. For the PSRC model, this set of data was used without modifications. For the Pierce County model, the regional land use forecast was reviewed and refined by Pierce County staff. The refinements, with PSRC's control total remaining fixed, were made to more accurately reflect the most recent housing growth trend and the potential developable lands available.

In order to represent the future transportation systems, both the PSRC and Pierce County models assumed completion of HOV lanes on I-5, existing SR 167, and SR 512. The PSRC model also reflected the completion of the commuter rail from Seattle, via Puyallup, to Tacoma.

Safety Issues

The overall accident rate within the project study area is below the statewide average. However, several locations on I-5 ramps within the study area have been identified as High Accident Locations based on 2003 and 2004 accident data:

- SB Off Ramp at Port of Tacoma Road
- NB Off Ramp at 54th
- NB Loop Off Ramp at Port of Tacoma Road (loop off)

High Accident Corridor locations for 2005-2007 have been identified at:

- I-5 MP 138 to MP 139.01
- I-5 MP 139.50 to MP 140.49

Heavy volumes of traffic, geometrics that do not meet current standards, and interchange-related congestion are the primary contributing factors to the accidents. The SR 167 project and the I-5 HOV project will correct some of the geometric deficiencies. In the interim, Olympic Region Traffic Operations will continue to provide low cost operational improvements that should lead to minor reductions in collisions. It is projected that the new freeway ramps will have ramp related accidents in the future. These accidents will be offset when traffic moves from local signalized arterials to the proposed SR 167 freeway extension, reducing congestion related accidents on nearby local arterials and some interchange ramps. The overall accident rate in the study area should remain unchanged with improvements in some segments offsetting impacts in other areas.

Deviations

Horizontal Stopping Sight Distance (HSSD) deviations are requested for three I-5 interchange ramps.

- Southbound SR 167 to Northbound I-5 HOV ramp
 - Reduce the Full Design Standard stopping sight distance (448.52 ft.) to 390.05 ft.

Northbound SR 167 to Northbound I-5- Reduce the Full Design Standard stopping sight distance (425 ft.) to 376.08 ft.

- Southbound I-5 to Southbound SR 167
 - Reduce the Full Design Standard stopping sight distance (425 ft.) to 400 ft.

Mitigation

I-5 north of the new interchange will experience increased traffic demand during both AM and PM peak period. The LOS for both build and no build will be "F" design year 2030. To improve this condition, a 5th general purpose lane would be needed in each direction. Adding a 5th lane would only improve the LOS to "E". The small benefit of adding the 5th lane is overshadowed by the large construction cost and is not being considered. At the January 2001 meeting with WSDOT, FHWA stated that the traffic analysis numbers presented for 2015 and 2030 were not significant enough to warrant the 5th and 6th lanes between the proposed I-5 interchange and SR 18. At a July 2003 meeting with WSDOT, FHWA stated that the APDR could be completed without additional lanes to SR 18. They did require, however, that HOV direct connect ramps be constructed at the year of opening.